

**Original Research Article****ABO and Rhesus Blood Group Distribution among Blood Donors from Rural based Medical College & Hospital at Warudi, Jalna (Maharashtra) India****Murtuza Shaikh<sup>1</sup>, K.S. Bhople<sup>2</sup>**

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**Abstract**

**Background:** The red blood cell surface has a system of antigens on them which constitute the Blood group system. Blood Group is an inherited trait in Mendelian fashion; there are 33 well defined blood group systems. But only ABO and RhD blood group status of the recipient and blood donor are taken into account in Transfusion Medicine.

**Aims:** The aim of study was to determine the ABO and Rh blood group distribution patterns in blood donors at Rural region of central Maharashtra .

**Design:** A retrospective study was carried out at blood bank of Rural based Medical college & Hospital at Warudi, Jalna (Central Maharashtra), India, for a period of 5 years from January 2013 to December 2017.

**Materials and Methods:** The study included 2,531 blood donors. Slide agglutination method with antisera ABO and Rh (Tulip diagnostics Ltd. and Span Diagnostics) was used to do ABO and Rh typing, and if any doubt persisted it was confirmed by tube agglutination method.

**Results:** The age group of predominant donors ranged between 18-25 years (68.03%).

Number of male donors surpassed that of female donors, with a ratio of 229:1. Blood group B (32.16%) was the most commonly encountered followed by 'O' (29.04%) and 'A' (26.31%) and AB (12.48%) which was the least common. The prevalence of Rhesus (Rh) positive was 94.47% and negative was 5.53% respectively.

**Conclusion:** It is really very important to know the distribution of blood groups in various population which would help the blood banks and transfusion service policies and would contribute significantly to the National Health System. We carried out this study to determine the frequency of blood groups in our region for the same purpose.

**Keywords:** ABO; Blood Groups; Blood Donors; Rural (Central Maharashtra) India; Rhesus.

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**Introduction**

Blood group is determined, by the ABO & RhD blood group antigens present on erythrocytes (RBCs). The term blood group is applied to any well-defined system of red blood cell antigens which are inherited characteristics. These antigens are either sugars or proteins, and they are

attached to various components on the erythrocyte cells. The antigens expressed on the human blood cell determine an individual's blood group. The main two blood group systems are called ABO and Rh (with Rh D-positive or Rh D-negative blood types) [1]. Nearly 700 erythrocyte antigens are described and organized into 30 blood group systems by the International Society of Blood Transfusion

of which ABO and Rh are most important [2]. The ABO blood group system is widely credited to have been discovered by the Austrian scientist Karl Landsteiner, who found three different blood types in 1900. He described A, B and O blood groups for which he was awarded the Nobel prize in 1930. Alfred Von Decastello and Adriano Sturli discovered the fourth type AB, in 1902 [3]. The discovery of ABO blood groups by Karl Landsteiner was an important achievement in the history of blood transfusion that was followed by discovery of Rh (D) antigen [4].

The Landsteiner's discovery opened the door to the birth of a wide spectrum of discoveries in the field of immune hematology, blood transfusion among humans irrespective of their natives, unmatched pregnancy, legal medicine, anthropology and the discovery of other blood group systems, all are deemed as an application or as a result of Karl's discovery [5]. Besides being important in relation to blood transfusion and organ transplantation, blood group antigens can also be utilized in genetic research, forensic pathology, anthropology and training ancestral relation of human [6]. There are differences in the distribution of ABO, and Rh (D) blood groups amongst different populations. The study of blood groups plays an important role in various genetic studies, in clinical studies for reliable geographical information and in blood transfusion practice, which will help in reducing morbidity and mortality rate. Knowledge of distribution of ABO and Rhesus (Rh) blood group is also essential for effective management of blood bank 1, 2 inventory [7]. Besides their importance in evolution, their relation to disease and environment is also very important [8,9]. The aim of present study was to identify ABO and Rh (D) blood groups distribution in patients and donor population at rural based Medical college & Hospital.

## Materials and Methods

Our study was a retrospective study carried out in a blood bank of Rural based Medical college & Hospital at Warudi, Jalna (Maharashtra) India, for a 5 year period from January 2013 to December 2017. After testing for medical fitness 2531 donors were considered as the study group they were also screened by medical officer according to blood donor selection criteria and guidelines from drug and cosmetics act and NACO.

The donors were in the age group of 18-55 years. After collecting blood The blood grouping was done by Agglutination test using anti-A, anti-B and anti-D human sera Blood group (ABO) and Rhesus factor was done by the antigen antibody agglutination test. The antisera used were obtained from commercial kits available (Tulip Diagnostics and Span diagnostics). The antiglobulin technique was used to confirm Rh negative blood groups. Data on frequency of ABO and Rh blood groups was reported in simple percentage form. The results were compared with other studies performed worldwide.

## Results

Out of 2531 donors, most of the donors belonged to age group of 18-25 years (68.03%) and least belonged to the age group of 46 and above (0.31%) [Table-1]. The number of Male donors (99.57%) was significantly higher than the female donors (0.43%) [Table 2]. According to our study blood group B (32.16%) was the most commonly encountered followed by Blood groups 'O' (29.04%) and A' (26.31%) and AB (12.48%) being the least common. The prevalence of Rh positive donors (94.47%) was much higher compared to Rh negative donors (5.53%) [Table 3].

**Table 1:** Age wise Distribution of study population (n=2531)

Age Groups in Years	Number of donors
18 -25	1722 (68.03%)
26 - 35	723 (28.57%)
36 - 45	78 (3.08%)
46 - 55	08 (0.31%)

**Table 2:** Gender wise Distribution of donors.(n=2531)

Gender	No. of donors	Percentage (%)
Male	2520	99.57 %
Female	11	0.43 %

**Table 3:** Frequency of Distribution of ABO & Rh blood groups systems among present study group. (n=2531)

Blood Group	A (%)	B (%)	AB (%)	O (%)	Total (%)
Rh Positive	625 (24.69%)	768 (30.34%)	297 (11.73%)	701 (27.69%)	2391 (94.47%)
Rh Negative	41 (1.61%)	46 (1.82%)	19 (0.75%)	34 (1.34%)	140 (5.53%)
Total	666 (26.31%)	814 (32.16%)	316 (12.48%)	735 (29.04%)	2531 (100%)

**Table 4:** Comparison between distribution of ABO and Rhesus blood groups in various geographical areas

S. No.	Location of study	A	B	AB	O	Rh +ve	Rh-ve
<b>Within India</b>							
1	Present study	26.31	32.16	12.48	29.04	94.47	5.53
2	Uttarakhand [ 2 ]	28.70	32.07	10.53	28.70	94.49	5.51
3	Ahmedabad [3]	21.94	39.40	7.86	30.79	95.05	4.95
4	Maharashtra(Loni) [6]	28.38	31.89	8.72	30.99	95.36	4.64
5	Devanagere [12]	26.15	29.85	7.24	31.76	94.8	5.2
6	Lucknow [13]	21.73	39.84	9.33	29.10	95.71	4.29
7	Durgapur [14]	23.90	33.60	7.70	34.80	94.70	5.30
8	Bangalore [15]	23.85	29.95	6.37	39.82	94.2	5.8
9	Shimoga-Malnad [16]	24.27	29.43	7.13	39.17	94.93	5.07
10	Pondicherry[24]	39.50	20.50	34.00	6.50	93.50	6.50
<b>Outside India</b>							
11	Pakistan [18]	27.92	32.40	10.58	29.10	90.13	9.87
12	Britan[19]	42	8	3	47	83	17
13	Australia[20]	38	10	3	49	NA	NA
14	Nigeria [21]	21.60	21.40	2.80	54.20	95.20	4.80
15	Nepal [22]	34	29	4	33	96.7	3.3

## Discussion

Blood groups and Rh antigen are hereditary. Gene for ABO antigens on the 9<sup>th</sup> chromosome and Rh antigen gene is on the 1<sup>st</sup> chromosome [10]. The ABO blood group distribution varies regionally, from one population to another [6]. In the study conducted by us, the number of male donors was 99.5% as was also seen in various other studies [2, 3, 5, 6, 11, 12]. This is because of the fact that in developing country like India, because of social taboo, cultural habits, lack of motivation and fear of blood donation, female donors were very less. The fear regarding blood donation in females needs to be driven out by making them aware about the advantages of blood donation [3, 5]. The main work force of any society is the age group of 18 to 35 years. So, they are most frequently encountered donating blood [2]. Our study also came out with the same outcome along with many studies done elsewhere [2, 3, 5, 12].

As for the ABO blood group distribution was concerned, our study showed group 'B' as the most frequently distributed among study population. Studies done by Chandra et. al. [13], Patel et. al. [3], Giri et. al. [6], and Parul et. al. [2] had similar observations [Table 4], while studies done at certain places like Karnataka [7], Devanagere [12], Durgapur [14], Bangalore [15], Shimoga-Malna [16], and Vellore [17] have observed 'O' blood group to be the most common. We also did a comparison of our study with other countries and found out that our results were in comparison with study done in Pakistan [18], but in contrast with studies done in Britain [19], Australia [20], and Nigeria [21] which showed group 'O' as the most prevalent. Whereas study from Nepal [22] has shown group 'A' to be the most commonly encountered. As far as incidence of Rh grouping was considered, our results

showed 94.47% Rh positivity and 5.53% Rh negativity. This observation was in comparison with other studies [2, 3, 6, 7, 17, 23, 24]. Even many international studies have depicted similar findings [18, 21, 22].

## Summary

Currently, our knowledge on the frequency and distribution of different blood types according to ABO and Rh blood group systems is helpful in planning of our blood donation and supply of blood in transfusion services. The database so created would probably be of help in blood transfusion services particularly in this locality.

## Acknowledgement

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*Conflict of Interest:* NONE

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